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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/973,170	10/04/2001	Eric S. Maniloff	S-97,774	6725

35068 7590 09/09/2003

UNIVERSITY OF CALIFORNIA
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EXAMINER

ANGEBRANNDT, MARTIN J

ART UNIT	PAPER NUMBER
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1756

DATE MAILED: 09/09/2003

8

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n N .

09/973,170

Applicant(s)

MANILOFF ET AL.

Examiner

Martin J Angebrannt

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 May 2002 and 22 July 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 7.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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1. The examiner notes that a non-signing inventor is named and that the petition to accord the instant application Rule 1.47(a) status has been granted. (paper 6)

This application is a CIP of the parent application. In the parent application, the language relating to the ability of the material to undergo a charge transfer in the absence of an externally applied dc electric field was considered new matter. While the applicant demonstrated that this functionality exists for at least some of the materials disclosed in the parent application, this language did not appear in the parent application and therefore the scope of the claim cannot be accorded a filing date prior to that of the instant application. (10/04/2001). The examiner also notes that the language describes a functionality of the material ("preparing a mixture, such that ...charge transfer occurs ... in the absence of an externally applied dc field.."), but does not preclude the use of an applied DC field based upon the language itself and the location of that language in the mixing step, not the irradiation step.

2. The disclosure is objected to because of the following informalities: The reference to Jenssen et al at line 19 of page 12 is incomplete.

Appropriate correction is required.

Also, please provide a copy of the reference to complete the record.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Please replace "dc" with - - DC- - as this is an abbreviation.

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The claims should also indicate that this is a transient grating (ultrafast and dynamic appear in the specification) and use a femtosecond laser exposure. The current language does not limit the invention to the transient gratings or the method to femtosecond NDFWM, which the invention is limited to as the gratings are not the longer term gratings generally disclosed in the prior art.

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 1-8 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The current language does not limit the claimed invention to the transient gratings or the method to femtosecond NDFWM, which the disclosure is limited to.

The examiner notes that limiting the claims to femtosecond non-degenerate four wave mixing (Spec. at page 1/lines 7-8) producing ultrafast or dynamic gratings would also serve to obviate at least some of the prior art based rejections appearing below.

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1-8 are rejected under 35 U.S.C. 102(b) as being fully anticipated by Maniloff et al., "Charge transfer polymers: a new class of materials for non-linear optics", SPIE Vol. 2854 (08/1996) pp. 208-213.

Maniloff et al., "Charge transfer polymers: a new class of materials for non-linear optics", SPIE Vol. 2854 (08/1996) pp. 208-213 teaches the use of frequency doubled output of a 150 femtosecond pulsewidth Ti:Sapphire (400 nm) to record the grating and the fundamental output (800 nm), which is not absorbed, to probe the grating.(page 209). This is NDFWM. The materials used include MEH-PPV doped with fullerenes.

The removal of the language added to the claims ("...., such that ...charge transfer occurs ... in the absence of an externally applied dc field..") would obviate this rejection as this would bring the scope of coverage sought to be commensurate in scope with the disclosure of the parent applications and accord the claim the earliest filing date of those applications. (60/016,093 filed 07/08/96).

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10. Claims 1-4 are rejected under 35 U.S.C. 102(b) as being fully anticipated by Prasad et al., "Polymeric composite photorefractive materials for nonlinear optical applications", SPIE Vol. 2143, pp. 80-86.

Prasad et al., "Polymeric composite photorefractive materials for nonlinear optical applications", SPIE Vol. 2143, pp. 80-86 describes a mixture of polyvinyl carbazole, 4-(N,N-diethylamino)-beta-nitrostyrene (DEANST) and either 4-(4-dimethylaminophenyl)-2,6-diphenylthiapyrylium perchlorate (TPY) or fullerene (C_{60}) cast on onto ITO coated glass substrates. A field was applied and a grating formed using 703 nm (for the TPY) or 645 nm (for the fullerene) radiation from an argon ion pumped Ti-Sapphire with powers of 0.62 and 0.57 W/cm^2 . The grating was read with a HeNe laser at 633 nm. (page 84). The same experiment appears to have been conducted for the fullerene sensitized solution, which describes a diffraction efficiency of 1.1% with an applied field.

The examiner notes that the claims do not preclude the use of an electric field in the NDFWM process, but requires the materials to be able to undergo the charge transfer in the absence of an applied field. The examiner notes that the experimental conditions of the instant application use a similar experimental set-up to that disclosed by Prasad et al., "Polymeric composite photorefractive materials for nonlinear optical applications", SPIE Vol. 2143, pp. 80-86, but the Ti:Sapphire produces 3 microjoule pulses with a length of 150 femtoseconds. This translates to $(3 \times 10^{-6} \text{ J divided by } 150 \times 10^{-15} \text{ seconds}) = 2 \times 10^7 \text{ W}$, which is more than 7 orders of magnitude larger than that used in the reference (page 8/line 18-page9/line 19) and is shown in figure 4 to last on the order of 10 picoseconds (10^{-12} sec).

The separation between the writing wavelengths and the probe beam are too close for the fullerene (12 nm) to holds that the probe/measurement wavelength is not absorbed by the fullerene. Therefore the claims reciting the presence of a fullerene are not rejected under this heading.

This rejection and those below based in part upon Prasad et al. would be obviated by the addition of language that limiting the claims to femtosecond non-degenerate four wave mixing (Spec. at page 1/lines 7-8) producing ultrafast or dynamic gratings

11. Claims 1,2,4-5 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prasad et al. "Polymeric composite photorefractive materials for non-linear optical applications" SPIE Vol. 2143, pp 80-87, in view of Liu et al. '228.

Liu et al. '228 teaches that with NDFWM, a wavelength to which the photorefractive crystal is not sensitive can be chosen, which results in high diffraction efficiencies as the hologram will not be erased as with DFWM. (5/20-32).

It would have been obvious to one skilled in the art to modify the NDFWM processes taught by Prasad et al., SPIE Vol. 2143 to use a non-absorbed beam based upon the direction of Liu et al. '228 which teaches that higher diffraction efficiencies may be achieved as the read beam does not effect erasure. In non-degenerate four wave mixing (NDFWM) a different wavelength from that used in the writing of the grating is used as the probe beam, where a degenerate four wave mixing (DFWM) uses the same wavelength for grating formation and reading (Prasad et al. page 83, last line). This results in some erasure by the probe beam (Liu et al. '228), which in the case of NDFWM does not occur.

The examiner notes that Sariciftci et al. (in Science vol. 258 (1992), cited by applicant) indicates on page 1476 indicates that similar donors and fullerene derivatives would be expected to have similar properties. Pang et al., (J Chem Phys, cited by applicant) indicates that poly(3-

dodecylthiophene) generate picosecond gratings during DFWM without charge transfer when irradiated with femtosecond pulses.

12. Claims 1-6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prasad et al. "Polymeric composite photorefractive materials for non-linear optical applications" SPIE Vol. 2143, pp 80-87, in view of Liu et al. '228 and Bjorklund et al.'148.

Bjorklund et al.'148 teaches various photorefractive compositions. Useful charge transport polymers include polyvinyl carbazole (PVK), polyaniline, polysilanes and poly (p-phenylene vinylene). (3/45-68) Useful sensitizing agents include C₆₀, C₇₀, and tetracyanoquinodimethane:anthracene complexes. (5/5-21).

It would have been obvious to one skilled in the art to modify the NDFWM processes taught by Prasad et al., SPIE Vol. 2143 to use a non-absorbed beam based upon the direction of Liu et al. '228 which teaches that higher diffraction efficiencies may be achieved as the read beam does not effect erasure. It also would have been obvious to one skilled in the art to substitute other materials known within the art to have the same function, such as the tetracyanoquinodimethane:anthracene complexes or C₇₀, for TPY or C₆₀ and/or and poly (p-phenylene vinylene) for PVK used in the examples of Prasad et al., SPIE Vol. 2143 with a reasonable expectation of achieving comparable results based upon the disclosure of equivalent function and utility by Bjorklund et al.'148.

13. Claims 1-6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prasad et al. "Polymeric composite photorefractive materials for non-linear optical applications" SPIE Vol. 2143, pp 80-87, in view of Liu et al. '228 and DuCharme et al. '264.

DuCharme et al. '264 teaches various photorefractive compositions. Useful charge transport polymers include polyvinyl carbazole (PVK), poly(thienylene vinylene) and poly (p-phenylene vinylene). (9/20-50) Useful charge generating agents such as phthalocyanine compounds are also disclosed. (7/36-46).

It would have been obvious to one skilled in the art to modify the NDFWM processes taught by Prasad et al., SPIE Vol. 2143 to use a non-absorbed beam based upon the direction of Liu et al. '228 which teaches that higher diffraction efficiencies may be achieved as the read beam does not effect erasure. It also would have been obvious to one skilled in the art to substitute other materials known within the art to have the same function, such as phthalocyanine, for TPY or C₆₀ and/or and poly (p-phenylene vinylene) for PVK used in the examples of Prasad et al., SPIE Vol. 2143 with a reasonable expectation of achieving comparable results based upon the disclosure of equivalent function and utility by DuCharme et al. '264.

14. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prasad et al. "Polymeric composite photorefractive materials for non-linear optical applications" SPIE Vol. 2143, pp 80-87, in view of Liu et al. '228 and Bjorklund et al.'148, as applied to claims cited above, and further in view of Hari et al. JP 07-316548 or Sariciftci et al. '880.

Sariciftci et al. '880 teaches various photoconductive polymers which form charge transfer complexes with fullerenes, including polyvinyl carbazole (PVK) (fig 1H), polyaniline (fig. 1N), poly(3-alkylthiophene) (figure 1K), poly (p-phenylene vinylene) (figure 1F) and poly(2-methoxy, 5-(2'-ethylhexoxy)-p-phenylene vinylene) or conjugated oligomers (col. 4/line 45-50)

Hari et al. JP 07-316548 (**machine translation attached**) teaches the use of donor compounds such as phthalocyanine dyes, and the use of various polymers in forming photorefractive materials, such as polyvinyl carbazole (PVK) and poly (3-alkylthiophene)s, such as poly (3-hexylthiophene). (abstract and STN sheet.)

In addition to the basis above, the examiner holds that it would have been obvious to one skilled in the art to substitute other materials known within the art to have the same function, such as poly (p-phenylene vinylene), poly (3-hexylthiophene), poly(2-methoxy, 5-(2'-

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ethylhexoxy)-p-phenylene vinylene) or oligomers thereof for PVK or poly (p-phenylene vinylene) disclosed by Prasad et al., SPIE Vol. 2143 or Bjorklund et al.'148 with a reasonable expectation of achieving comparable results based upon the disclosure of equivalent function.

The rejection remains. for the reasons provided above as no further arguments were offered by the applicant.

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Nolte et al. Appl. Phys. Lett., 58(19) pp 2067-2069 and Brubaker et al.. JOSA B, 11(6), pp. 1038-1044 teach the benefits of using non degenerate four wave mixing. (ie the gratings are not erased (left column page 2069 and in the abstract on page 1038)

Hirao et al. '950 indicates that an applied field is not necessary (13/2-10, 18/20-23), but only disclosed optically inert polymers merely as binders or matrix materials (14/42-56).

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin Angebranndt whose telephone number is (703) 308-4397.

I am normally available between 7:30 AM and 5:00 PM, Monday through Thursday and 7:30 AM and 4:00 PM on alternate Fridays.

If repeated attempts to reach me are unsuccessful, my supervisor may be reached at (703) 308-4552.

Facsimile correspondence should be directed to (703) 305-3599.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0661.



Martin J. Angebranndt
Primary Examiner, Group 1750
October 14, 1999